

# CU IN THE WOODS

Clemson Extension Forestry and Wildlife Newsletter



## Invasive Species Spotlight Tree-of-Heaven (*Ailanthus altissima*)

By Jeff Fellers

Take just a short drive down the road or interstate, and I bet you will have a good chance of seeing Tree-of-Heaven. In the last few years, I have really started to notice this tree along the sides of roads. I have also made numerous landowner visits where I have seen it on their property. Tree-of-Heaven can be found throughout much of the continental U.S., as indicated by figure 1. While it is native to Eastern China, it was introduced to the U.S. in 1784 from Europe as an ornamental.

Tree-of-Heaven is a rapidly growing tree that has the capability to form dense stands. It is also

allelopathic, which means it creates a biochemical that can suppress other plant species' germination, growth, and survival.

The tree can reach 80 feet in height and has long, pinnately compound leaves with circular glands under the lobes of the leaflet bases. The leaves are alternate with 10 to 41 leaflets on 1 to 3-foot stalks. To me, the leaves resemble those of sumac, except they can be much longer.

Tree-of-Heaven flowers between April and June. The flowers can be seen in figure 2. Typically, you will see long terminal clusters of small yellowish-green flowers. As seen in figure 3, the flowers produce seeds that can stay on the tree from July to February. The seed is where you can really notice the difference between Tree-of-Heaven and sumac as seen by the Tree-of-Heaven seed in figure 3 and sumac



Figure 1. Map showing documented cases of Tree-Of-Heaven. Image from Virginia Tech Dendrology Webpage



Figure 2. Tree-of-Heaven flowers  
Image Source: Jan Samanek, Phytosanitary Administration, Bugwood.org



Figure 3. Tree-of-Heaven Fruits  
Image Source: Jan Samanek, Phytosanitary Administration, Bugwood.org



Figure 4. Seed head from Smooth Sumac  
Image Source: Steven Katovich, Bugwood.org

## UPCOMING EVENTS

### Bradford Pear Bounty

October 23rd

1:00pm- 4:00pm

For more information- <https://www.clemson.edu/extension/bradford-pear/index.html>

### Half and Half Webinar Series

November 17th

1:00- 2:30

Contact Parker Johnson for more information- [pdjohns@clemson.edu](mailto:pdjohns@clemson.edu)

### Webinar- 2 Critters/ 1 workshop: Mosquitos and Wildlife Tracks/Scat

November 18th

12:00- 2:30

Free to attend

[www.eventbrite.com/e/2-critters-1-workshop-tickets-122465007133](http://www.eventbrite.com/e/2-critters-1-workshop-tickets-122465007133)

### Conservation Easement Workshop

February 2022

Contact Janet Steele for more information- [jmwatt@clemson.edu](mailto:jmwatt@clemson.edu)

### Chainsaw Safety and Training

March 19, 2022

Sandhills State Forest

Contact Janet Steele for more information- [jmwatt@clemson.edu](mailto:jmwatt@clemson.edu)

### CFE Opportunities:

You can find a list of current CFE opportunities at this website:

[https://www.clemson.edu/extension/forestry/continuing\\_education/index.html](https://www.clemson.edu/extension/forestry/continuing_education/index.html)

### More Events:

You can find a list of more events at this website:

<https://www.clemson.edu/extension/forestry/events.html>

**Check out our blog page for past articles and other great forestry and wildlife information-** [blogs.clemson.edu/fnr](https://blogs.clemson.edu/fnr)

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## Invasive Species Spotlight Tree-of-Heaven (*Ailanthus altissima*) Cont.

seed head in figure 4. The Tree-of-Heaven seed is very prolific and can be spread by wind and water. Tree-of-Heaven can also reproduce by root sprouts and resprouts previously from cut stumps.

### Recommended Control Procedures:

**Large trees:** Make stem injections and then apply Garlon 3A, Pathway\*, Pathfinder II, or Arsenal AC\* in dilutions and cut spacings specified on the herbicide label (midsummer best, late winter somewhat less effective). For felled trees, apply these herbicides to stem and stump tops immediately after cutting.

**Saplings:** Apply Garlon 4 as a 20-percent solution in basal oil, vegetable oil, crop oil concentrate, diesel

fuel, or kerosene (2.5 quarts per 3-gallon mix) or apply undiluted Pathfinder II to young bark as a basal spray. **Seedlings and saplings:** Thoroughly wet all leaves with one of the following herbicides in water with a surfactant (July to October): Arsenal AC\* as a 1-percent solution (4 ounces per 3-gallon mix), Krenite S as a 15-percent solution (3 pints per 3-gallon mix), Garlon 4 as a 2-percent solution (8 ounces per 3-gallon mix), or Escort XP\* at 1 ounce per acre.

Prescriptions used from Nonnative Invasive Plants of Southern Forest: A Field Guide for Identification and Control publication.

\*Nontarget plants may be killed by root uptake

## Interspecies Plantings to Improve Future Oak Log Quality

By Stephen Peairs

The booklet entitled, *Forest Trees of South Carolina* (SC Forest Commission 2018) contains 18 oak species commonly found in South Carolina. Six of these species are considered bottomland oaks and may exist in the stream floodplains. Silvicultural researchers have investigated the beneficial relationship between different bottomland tree species (oak and non-oak) growing in proximity to one another in natural and artificially regenerated stands. Clatterbuck and others (1985) and Clatterbuck and Hodges (1988) observed within even-aged, mixed-species hardwood stands (on Mississippi Gulf Coastal Plain Region) that faster-growing species are dominant early in stand development but tend to become subordinate to oak during the stem exclusion stage of stand development. In these studies, sweetgum established dominance with high stem density early, but after a couple decades, cherrybark oak surpassed the gums in height to occupy dominant crown positions. Research has suggested that when sweetgum stems averaged 1.8 – 5.5 meters (5.9 feet – 18 feet) from a cherrybark oak, oaks would be restricted with lower height and diameter. If the cherrybark oak, however, was not completely overtopped and could benefit from some overhead sunlight, the oak would catch and stratify above the sweetgum by age 25 (Clatterbuck and Hodges 1988, Lockhart and others 2005). In natural settings or on sites recently disturbed (such as timber harvesting), colonization by light wind or water disseminated species should supply stems to train the oaks' vertical form. This colonization may only exist up to 300 feet from forested edges, however (Stanturf and others 2000). Should stocking density be higher with stems less than 5 feet from the preferred oak reproduction, some form of woody release (directed foliar sprays or basal bark herbicide applications) is warranted to ensure oak reaches superior crown positions in the developing stand.

Greater cherrybark oak development was observed in an artificial regeneration study looking at said species planted with sweetgum. Lockhart and others (2006) stated that at age 17, the oaks were similar in height and diameter. At 21 years after planting, both height and diameter (see table 1) at breast height (dbh) were statistically greater than sweetgum. Height growth for cherrybark oak ranged from 4.26' – 9.8' greater than sweetgum across planting densities. Cherrybark oak had displaced 97% of the formerly dominant sweetgum into either overtopped or intermediate crown classes regardless of spacing (8'x 8' or 5' x 5') treatment. Cherrybark oak that reached either dominant or codominant crown classes was calculated at 74% (8'x 8' spacing) and 53% (5'x 5' spacing).

**Table 1. Diameter (dbh, measured at 4.5 ft above ground) of cherrybark oak and sweetgum planting in mixtures at different spacings in Oktibbeha County, MS, USA over a 21-year period.**

Spacing	Species	dbh- 1989 (inches)	dbh-2002 (inches)	2002 Survival
8 feet	Cherrybark	1.81 (±0.79)	7.01 (±2.28)	89%
	Sweetgum	2.40 (0.32)	5.59 (0.51)	100%
5 feet	Cherrybark	1.30 (0.51)	4.88 (2.60)	80%
	Sweetgum	1.42 (0.20)	2.99 (0.31)	99%

Table adapted from Lockhart and others (2006). Measurements from journal article were converted from metric to English units.

Scientific reasoning for this occurrence may be attributed to a number of factors. These include:

**1. crown form** – sweetgum exhibits an excurrent crown form represented by branching remaining close

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## Interspecies Plantings to Improve Future Oak Log Quality Cont.

to the main bole (conical shaped) even in “open” growing conditions. Oak species tend to be more semi-excurrent when competing with adjacent trees but convert to a decurrent (wide, spreading branch crown or rounded shape) (Lockhart and others 2006, Lockhart and others 2008)

**2. crown abrasion** – smaller, more brittle twigs (such as exhibited by sweetgum) can break when battered against more stout oak limbs during heavy wind events (Lockhart and others 2006, Lockhart and others 2008). This is important in terms of crown expansion.

**3. phenology** – the onset of bud break in oak begins from the top of the crown and advances downward (basipetally) whereas sweetgum does the opposite (acropetally). Sweetgum also begins several days later (Young 1980).

**4. branching pattern** – species with opposite branching patterns (such as ash, maple) may respond more slowly following terminal twigs (from abrasion) given the emergence of new twigs occurs at 45° – 90° from the boles. These new twigs require time to “curve” up towards overhead light.

**These trainer tree attributes result in adjacent oaks displaying more elongated, “cleaner” boles meaning the increased probability of higher log grade or quality.**

Lockhart and others (2008) developed a ranking system for bottomland species that could serve as potential trainer trees. The previously mentioned factors were given point values based on whether the species had desirable or less desirable characteristics. The following abbreviated table was developed from a more extensive list of species found in the publication. The species presented here are what the author suspects landowners in South Carolina may be most interested in planting around bottomland oaks or have a high likelihood of naturally colonizing (maples).

**Table 2. Rating system for trainer trees by hardwood species.**

Species	Tree form	Early height growth pattern	Branching pattern	Twig diameter durability	Shoot growth	Total
Sweetgum	15	30	15	30	10	100
Bald cypress	15	30	15	30	5	95
Green ash	15	30	5	30	10	90
Persimmon	15	20	15	30	5	85
Red/silver maple	10	30	5	30	10	85

Table adapted from Lockhart and others (2008)

Planting density can also influence the future potential log quality for oak. Tighter spacings are preferred as wider spacings delay crown closure and intraspecific competition among the planted oak trees. Self-pruning is thus later which promotes defect occurrence and reduces merchantable bole length (Clatterbuck and Hodges 1988). In non-forestland receiving afforestation (planting to create forestland from non-forestland), a tighter spacing, such as 8' x 8', should promote quality stem development.



Figure 1. Retention of branches on lower bole for a longer duration can lead to log defects. Also, note the poor crown stratification due to decurrent crown form. Species with excurrent crowns (sweetgum, yellow-poplar, etc) are more likely to perform well as monocultures, similar as they are found in nature. Photo: Dr. Wayne Clatterbuck

If the area has a high potential to be invaded with seed from adjacent forestland or was previously harvested/ disturbed forestland, colonization by natural means (such as by sweetgum) may provide the higher stocking density needed to improve future oak bole quality.

Less research appears to have been performed to investigate trainer species to improve upland oak. Schubert and others (2020) suggest that black cherry may be a good option for trainer trees on moderately productive upland sites. The species has smaller-sized leaves, a more distributed leaf arrangement, and an alternate branching pattern which contributes to a low canopy light extinction rate. In other words, more sunlight can penetrate through this species' crown compared to other species, such as ash. The Schubert and others (2020) study also found that black cherry had a larger average dbh (after seven years of growth), regardless of spacing, over yellow-poplar but statistically similar to sweetgum. Thus, all three of the species have rapid early rates of growth. Black cherry also provides soft mast forage for wildlife and may have the potential for producing high-demand lumber in the Appalachian region.

Another potential species that can grow on upland sites is common persimmon. This species had a high rating (Lockhart and others 2008) for serving as bottomland trainer trees. Logic would stand to assume that

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## Interspecies Plantings to Improve Future Oak Log Quality Cont.

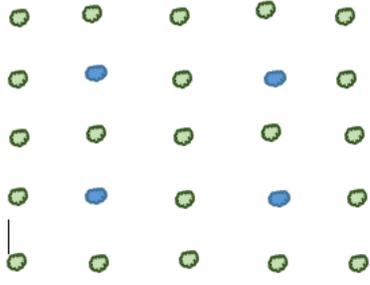


Figure 2. Illustration of planting row scheme for promoting oak bole quality. Blue shapes represent oak and green are trainer species. A complete row of trainer trees lies adjacent to rows with alternating species.

given the species-wide site tolerance and acceptable growth form that the species can also be utilized in mixed planting on upland sites. The wildlife preference/usage of the species is also a strong factor for selection as a component of stock to be planted.

One other consideration in addition to planting

spacing is the sequence among species planted on a given row. Most of the previously mentioned studies followed alternating rows with a row of trainer tree only, followed by alternating oak with trainers on the subsequent row. An illustration of this species planting arrangement is depicted in figure 2.

This row arrangement may also enable easier guidelines for conducting a thinning of the stand. The individual rows comprised of only trainers can be removed initially after oak crown stratification and clear bole appearance on oak has occurred. This will enable oak crowns to expand into the created additional growing space which should support increased volume production.



Figure 3. Cherrybark oak monoculture stand that has been mechanically thinned and pruned to approximately 8±feet in height. Even with high management intensity, oak are substantially of lower height compared to adjacent green ash monoculture, still have branch retention affecting log grade, and exhibit poor crown stratification. Photo: John Brown, taken on the family farm in Greenville County.

In conclusion, land managers that are attempting afforestation of non-forestland to forestland may choose to consider a mixed plantation containing both oak and one or more other species for economic, wildlife, biodiversity, improved pest resilience, periodic revenue from thinning, or any other reason. Properly placing tree species that are adapted to particular soil conditions found in either bottomlands or uplands is critical for long term success and survival of planted stock. Oaks established on recently disturbed forestland or in immediate proximity (less than 300 feet) may rely on natural colonization from early successional tree species (such as sweetgum or maples) as opposed to planting trainer trees. In the latter case, some form of stand-

thinning or woody release around planted oaks may be necessary. Based on scientifically observed physical development of species like sweetgum, it has been suggested that oak bole quality and more dominant crown positions by oak can be achieved through mixed-species planting.

### References:

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# Tractors and Implements for Forest Landowners- Part I: Tractors

By Stephen Pohlman

As a forest landowner myself, I cannot imagine actively managing property without using the modern-day tractor. In the coming series of articles, I want to discuss the importance of tractor implements and how they can help you manage your property. But first, let's discuss the tractor and the needs of the forest landowner. In this first installment, we will talk about the essential things a new-to-intermediate skill level tractor operator should consider when buying a tractor for forestry and wildlife work on their property.

Now I'm not going to tell you to buy green, orange, blue, or whatever in this article. But what I will recommend is that you evaluate a few major things when considering a tractor. The forest landowner needs to assess the kind of conditions they will use the tractor in predominately and be honest with oneself during this evaluation process. Consider factors like space required while driving on the property, terrain to traverse, annual task needs of the property, major tasks to accomplish. Also, consider whether the tractor will be stored on the property or have to haul it. If you are going to haul it, do you have a truck/trailer big enough to safely tow it within

the limitations set by the manufacturer and the laws of South Carolina? Another major consideration is the dealer and their dealer network. Tractors require maintenance and parts; thus, you'll want to consider dealer distance, expertise, and parts availability. Lastly, remember the old saying, 'you get what you pay for.' Most manufacturers have an Econoline versus their standard equipment line. Less expensive sometimes translates into less robust, and when considering a woods tractor, typically stronger is better. Once you have weighed this and maybe a few personal considerations of your own into the equation, you now have begun to narrow down your search.



You will want to make sure you have a vehicle and trailer rated for towing your tractor. Be sure to account for the weight of any implements you may tow as well. Photo credit: Stephen Pohlman, Clemson Extension.

## County Forestry Associations

**Abbeville County Forest Landowners Association**  
Contact: Tom Brant  
jbrant@clemson.edu

**Aiken County Forestry Association**  
Contact: Stephen Pohlman  
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**Anderson Forestry & Wildlife Association**  
Contact: Carolyn Dawson  
dawson4@clemson.edu

**Calhoun-Orangeburg Forest Landowners Association**  
Contact: Janet Steele  
jm watt@clemson.edu

**Chesterfield County Forestry Club**  
Contact: Ryan Bean  
rbean@clemson.edu

**Darlington/Florence Landowners Association**  
Contact: TJ Savereno  
asavere@clemson.edu

**Edgefield County Forestry Association**  
Contact: Stephen Pohlman  
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**Greenville Forestry & Wildlife Society**  
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**Greenwood County Forestry Association**  
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**Kershaw County Forest Landowner Association**  
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**Laurens County Forest Landowners Association**  
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**Lexington County Forestry Association**  
Contact: Janet Steele  
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**Lowcountry Landowners Association (Beaufort, Colleton, Hampton, Jasper)**  
Contact: Janet Steele  
jm watt@clemson.edu

**McCormick County Forestry Association**  
Contact: Tom Brant  
jbrant@clemson.edu

**Newberry County Forestry Association**  
Contact: Jeff Fellers  
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**Salkehatchie Forestry Association (Allendale, Bamberg and Barnwell)**  
Contact: Stephen Pohlman  
spohlma@clemson.edu

**Saluda County Forestry Association**  
Contact: Stephen Pohlman  
spohlma@clemson.edu

**Sumter County Forest Landowner Association**  
Contact: Ryan Bean  
rbean@clemson.edu

**Tri-county Forestry Association (Berkeley, Charleston, Dorchester)**  
Contact: Parker Johnson  
pdjohns@clemson.edu

**Williamsburg County Forest Landowners Association**

**Contact the Association nearest to you to find out about upcoming meetings!**

## Tractors and Implements for Forest Landowners- Part 1: Tractors Cont.

always on flat footing or perfect soil conditions, such as in farming. Safety should always be first, and you should never put yourself into an uncomfortable situation. With that said, a 4wd tractor can help with this due to the increased traction they offer. Also, a 4wd tractor can have better pulling ability due to the increased traction. Of all the many different options one can buy, this is a must to me for the forest landowner.

The tractor's stance, or distance between the tires, both front to back and side to side, is also a significant consideration. A tractor with a larger stance will have a better footing in off-camber situations if you live in the piedmont or upstate. A larger stance will also help when traversing unlevel conditions. Keep in mind that this also means a heavier weight tractor typically, so if you have towing



Some landowners prefer the simplicity of the forward-reverse pedals that the hydrostatic transmission offers. Photo credit: Stephen Pohlman, Clemson Extension

considerations to stay within, you must factor that. Tractor Overturn is the most common form of tractor accident, accounting for more than half of all tractor-related fatalities. You may decide to add weight to your rear tires for increased traction, be it water and antifreeze-filled tires or bolt-on wheel weights, but also keep in mind towing weight when you do these things if you will trailer your tractor.

Transmission selection is up to the buyer. Many buyers like a hydrostatic transmission. The simplicity of just forward-neutral-reverse makes it easy for most people to operate. Some feel that a gear-driven tractor will pull stronger due to direct gear contact versus a hydrostatic transmission pumping hydraulic fluid to make it move. Again, it's a personal preference. I personally like a hydrostatic transmission in 30hp & 40hp class tractors due to the amount of



Gear-driven transmissions are oftentimes found on older tractors and are often offered as a more affordable standard equipment option. Photo credit: Stephen Pohlman, Clemson Extension

frontend loader work that those types of tractors do. Plus, most buyers of this size tractor are pulling 5' and 6' implements, respectively, without issues. This tractor and implement size is arguably the most popular size purchased for forest land management by owners.

What about Horsepower (HP)? First, I have never heard anybody say they wished they had less horsepower. I've heard plenty of people say they wished they could pull the implement they have or a bigger implement so they can get done faster. Do note that I did not say 'go faster.' We will discuss this in more detail when we talk about ground contact implements in the next series. Typically, tractor HP-class is also directly related to a tractor's stance as well. Typically, a higher HP means a bump into the next class size. Many forest landowners are happy with the 30hp-class size tractor and the usage of 5' wide implements. The next bump up is a 40hp-class, and it allows you to get into 6' wide implements. As you would expect, a 50hp-class starts opening possibilities, but remember that also adds an increased size that you'll have to maneuver in the woods. Also, large implements typically significantly bump up in price.

Lastly, if you are an old-hand or a newcomer, please read and ensure you fully understand the safety sections in your owner's manuals. Sadly, most tractor-related accidents result in the loss of body parts and/or the loss of life. Most tractor accidents are avoidable if the operator has followed proper protocol. Beginning operators should seek advice and/or training from knowledgeable and skilled individuals. Many times, a dealership can advise a new owner on who may be locally able to help. Also, Clemson Extension does offer Farm Safety Workshops, with much of it being about tractor safety. Remember too that a properly maintained tractor is a safer tractor. Things like tire pressures, protective shields, clean steps and operator's platform, and safety switches are just a few things on a list that can help make a safer tractor.

In the next part of this series, we will discuss ground contact implements and how they can benefit the forest landowner. These implements will include those used for wildlife food plot management and fire breaks primarily.

# South Carolina's Stumpage Trends and Forest Carbon Market Update

By Puskar Khanal

## South Carolina Pulpwood Stumpage Price Trends:

Statewide pulpwood stumpage prices for both pine and hardwood were higher than the rates observed in the previous quarter. On average, South Carolina statewide pine pulpwood prices were \$10.66/ton in the 3rd quarter of 2021. On average, the statewide stumpage prices for mixed hardwood pulpwood were \$11.66/ton in this quarter. Both prices were little over 6% than the rates observed in the previous quarter. These price increases indicate an improved stumpage market and economic activities in this quarter.

**Carbon Market Updates:** The size of forest holdings and long-term contract requirements had been bottlenecks for many forest landowners willing to participate in the carbon market. New carbon market opportunities have made it suitable for forest landowners with as low as 30-40 acres to earn extra revenue from carbon credits by delaying final harvest for few extra years. In general, there are two types of carbon markets – voluntary or compliance-driven (regulatory). California Cap-and-Trade program is the most widely known regulatory forest carbon market in North American. This carbon credit program, recognized by the California Air

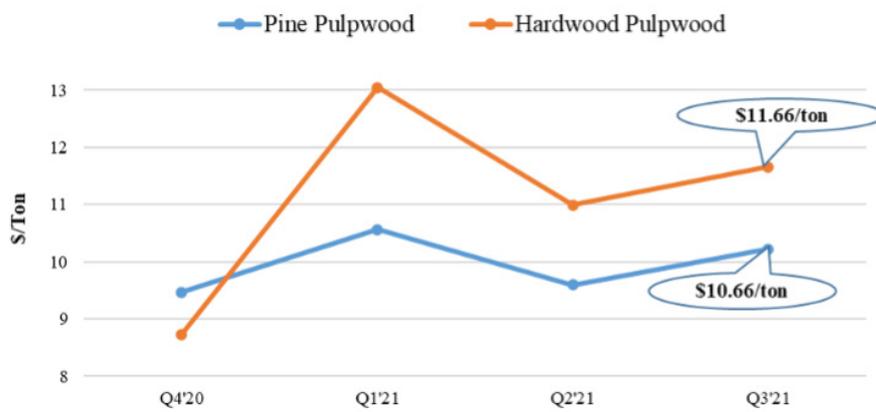
Resources Board, a gold standard in carbon credits, has rigorous requirements and broader recognition. It considers all properties in the United States but requires a 100-yr commitment to store and sequester carbon on the property. High up-front costs involved to verify and monitor carbon storage makes it more suitable for large acres. The average property size enrolled in this program was over 48,000 acres.

Voluntary carbon markets are often operated by private entities and offer more attractive terms to family forest landowners than the California Cap-and-Trade program. These markets are more suitable for small property

owners (less than 100 acres) because of flexible time commitments. One example of a voluntary forest carbon market available for forest landowners in South Carolina is Natural Capital Exchange (NCX), previously known as SilviaTerra. Some of these voluntary programs offer commitments as short as one year.

**Data credit:** The sawtimber and pulpwood price data included in this newsletter are published with permission from TimberMart-South Athens, GA 30605 email [tmart@timbermart-south.com](mailto:tmart@timbermart-south.com).

S.C. Statewide Pulpwood Stumpage Price

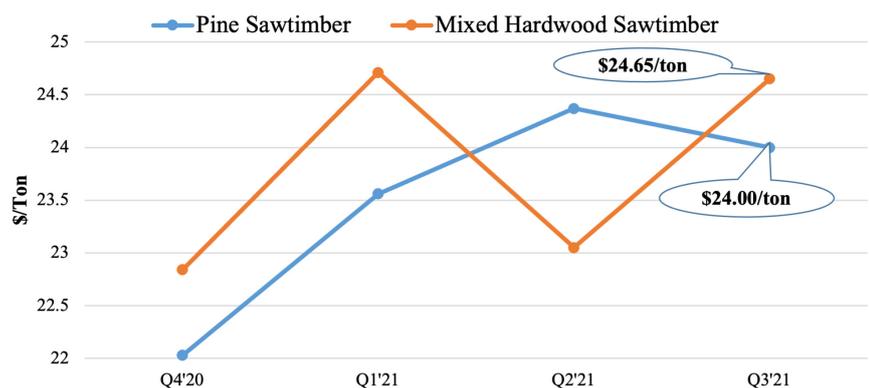


Graph of S.C. Statewide Pulpwood Stumpage Prices for Q3'21.

## South Carolina Sawtimber Stumpage Prices

**Trends:** Statewide pine stumpage prices observed less than a 2% decline in prices than the rates observed in the previous quarter, but the hardwood stumpage market had about a 7% increase in the rates from the previous quarter. On average, South Carolina statewide pine sawtimber stumpage prices were \$24.00/ton in the 3rd quarter of 2021. For mixed hardwood, the statewide stumpage prices, on average, were \$24.65/ton in this quarter. In the previous quarter, hardwood stumpage prices were lower than the pine stumpage prices, but the trend has reversed in this quarter. In general, the hardwood stumpage prices have increased about \$5/ton than the rates observed in the same quarter (Q3) last year, while the pine stumpage prices have increased about \$3/ton during this period. Forisk Wood Review report attributed multiple hurricanes events in the gulf coast region and limited wet weather harvesting opportunities for the sharp increase in hardwood prices this quarter. Forisk report link: <https://forisk.com/blog/2021/10/05/q3-2021-forisk-wood-fiber-review-southern-prices-on-the-rise/>

S.C. Statewide Sawtimber Stumpage Price



Graph of S.C. Statewide Sawtimber Stumpage Prices for Q3'21.

## 4-H Forestry- Why do leaves change colors experiment?

By Jaime Pohlman

The fall colors of the leaves are in them all along. We do not see them until Fall due to the amount of green chlorophyll in the leaves. Chlorophyll is what the plants use along with sunlight to make their food. When the trees are actively growing, they need a lot of food, so that is why the leaves are green for most of the year. In the fall, as the trees shut down for the winter, the chlorophyll breaks down, allowing the other pigments in the leaves to have their time to shine. The pigment anthocyanin causes the red color of leaves. The pigment carotene gives leaves bright orange color, and xanthophyll gives the leaves their yellow color.

A fun experiment you can do to see the different leaf pigments is leaf chromatography. You can do this any time of the year, but it is especially fun to do in the fall.

For this experiment, you'll need:

- Leaves (try to keep leaves from different trees separated)
- Rubbing Alcohol or Isopropyl Alcohol (68-72%)
- Glasses
- Unsharpened pencil
- Plastic Wrap
- Hot Water
- Coffee Filters

Step 1:

- Collect leaves
- Try to keep each tree species together.
- You can add to your experiment by trying green leaves and leaves that have already changed color.
- Be sure you do not collect leaves from poison ivy!

Step 2:

- Break the leaves into small pieces in one of your glasses.
  - Try to keep all leaves from one tree in one glass.
  - The smaller the pieces, the better.
  - Be sure to label your glasses so you know what tree species is in each one.



Break the leaves into as small of pieces as possible and put them into your glass. Photo credit: Jaime Pohlman, Clemson Extension.

Step 3:

- Cover the leaves with rubbing or isopropyl alcohol.
- Use an unsharpened pencil to mash the leaves really well.

Cover the leaves with isopropyl alcohol and mash them up really well. Photo credit: Jaime Pohlman, Clemson Extension.



Step 4:

- Place plastic wrap around the opening of your glass with your leaves and rubbing alcohol.
- Then place it into a shallow bowl.
- Pour hot water in the bowl around your glass.
- Let this sit for at least 30 minutes.
- You can swirl your glass occasionally.



Cover the glasses with plastic wrap and place them in a shallow bowl of warm water. Photo credit: Jaime Pohlman, Clemson Extension.

Step 5:

- Remove your jar from the bowl of hot water and remove the plastic wrap.
- Place in your coffee filter.
  - You can insert the whole filter in the jar or just cut the filter in strips.
  - Make sure your filter touches the leaf/alcohol mixture.
  - Let your filter sit in the glass for at least an hour, but the longer the better.
- Let your filter sit in the glass for at least an hour, but the longer the better.



Make your coffee filter into a funnel shape and place it into the jar. Make sure it touches the crushed leaves and alcohol. Photo credit: Jaime Pohlman, Clemson Extension.

Step 6:

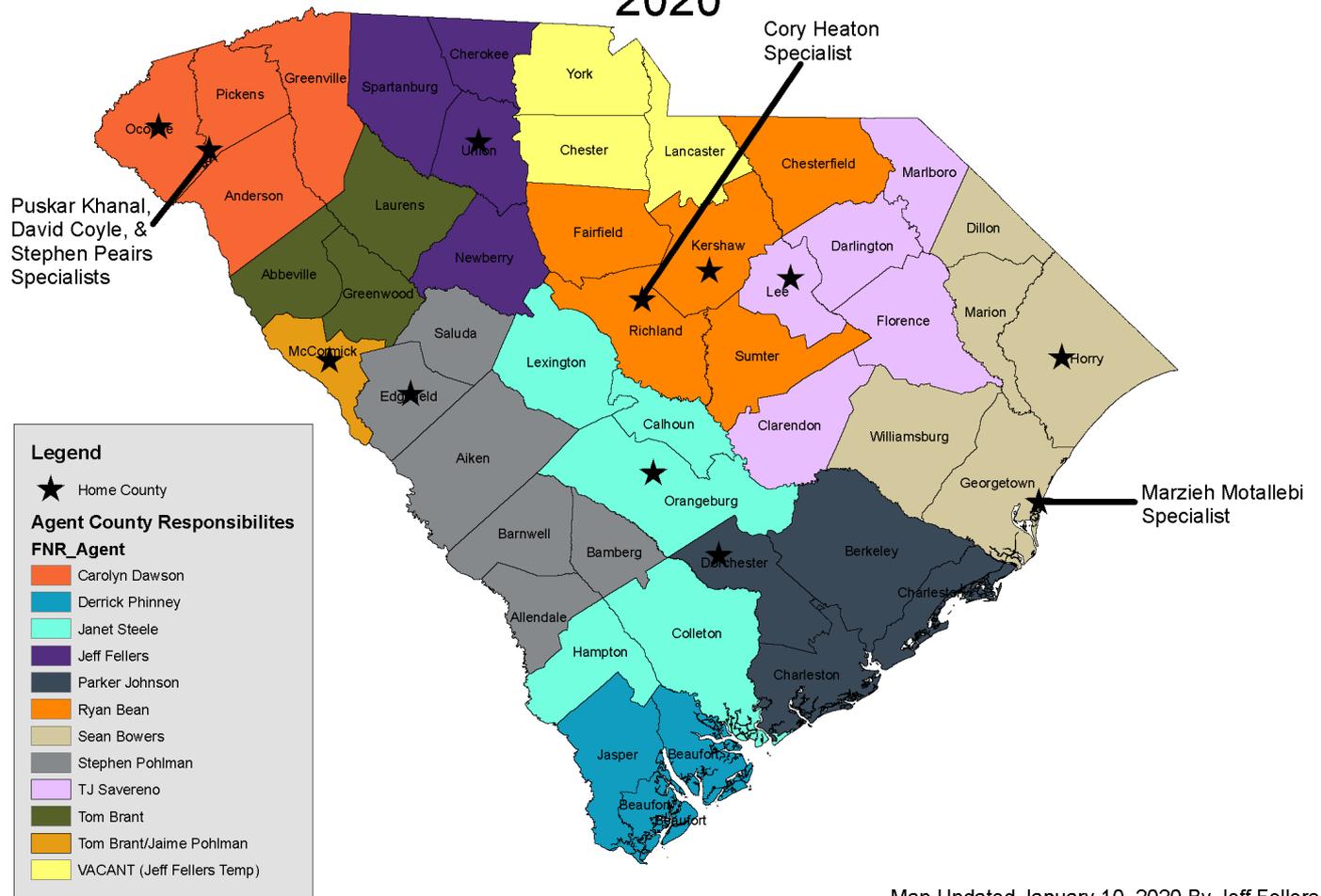
- Analyze your results.
  - What colors did you see?
  - Do the colors you saw match what color the tree's leaves change in the Fall?



The coffee filters show the red pigments from the leaves. Photo credit- Jaime Pohlman, Clemson Extension.



# Forestry & Wildlife Agent Coverage Across South Carolina 2020



Agent	Email	Background
Ryan Bean	rbean@clermson.edu	Forestry, Cost Share Programs, Prescribed Fire, Soil Types
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Carolyn Dawson	dawson4@clermson.edu	Forestry, Conservation, Forest Health, Firewise
Jeff Fellers	fellers@clermson.edu	Forestry, Geographic Information Systems
Parker Johnson	pdjohns@clermson.edu	Wildlife Management
Derrick Phinney	dphinne@clermson.edu	Forestry, Biomass, and Bioenergy
Jaime Pohlman	jaime@clermson.edu	Natural Resource Education, 4-H
Stephen Pohlman	spohlma@clermson.edu	Forestry, Thinning, Hardwood Valuation, Food Plots
TJ Savereno	asavere@clermson.edu	Wildlife Management, Native Vegetation, Invasive Species
Janet Steele	jmwatt@clermson.edu	Forestry and Wildlife, Ownership Transition, Longleaf Pine Management

Specialist	Background
Dave Coyle	Forest Health and Invasive Species Specialist
Cory Heaton	Wildlife Management Specialist
Puskar Khanal	Forest Economics Specialist
Marzieh Motallebi	Ecological Economics and Carbon Credits Specialist
Stephen Peairs	Forestry, Silviculture, and Hardwood Management Specialist

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<https://www.clemson.edu/extension/forestry/newsletter/index.html>

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